

WHAT IS CLAIMED IS:

1. A recording/reproducing apparatus, comprising:
 - a recording/reproducing part for recording or reproducing information
5 with respect to a recording medium;
 - a file system information processing part for managing the
information to be recorded or reproduced by the recording/reproducing part
as a file, using file system information having a directory hierarchical
structure capable of being referred to by a path name; and
 - 10 a contents management information processing part for managing the
directory and the file, using contents management information containing
object management information referred to by object reference information on
the path name,
wherein, when information on the recording medium is updated by
15 the recording/reproducing part, the file system information processing part
records information on the update in the file system information, and
the contents management information processing part records the
same information as the information on the update in the object management
information.
- 20 2. The recording/reproducing apparatus according to claim 1, wherein, in a
case where a new directory or a new file is recorded on the recording medium,
the directory or the file is assigned a unique ID that is identification
information not duplicated on the recording medium, and the assigned
25 unique ID is used as the information on the update.
3. The recording/reproducing apparatus according to claim 2, wherein the
file system information processing part records the unique ID in an extended
attribute in a file entry managing a structure of the directory or the file, and
30 the contents management information processing part records the
unique ID in the object management information so that the unique ID is
associated with object reference information.
4. The recording/reproducing apparatus according to claim 1, wherein a
35 value of the unique ID is determined by the file system information
processing part.

5. The recording/reproducing apparatus according to claim 1, wherein a value of the unique ID is determined by the contents management information processing part.
- 5 6. The recording/reproducing apparatus according to claim 2, wherein, in a case where the directory or the file referred to by the object reference information is detected not to be present in the directory hierarchy,
the contents management information processing part searches the file system information for the same value as that of the unique ID recorded
10 in the object management information, and when a directory or a file assigned the same value as that of the unique ID is detected, the contents management information processing part sets new object reference information in the object management information with respect to a path name of the directory or the file assigned the same value as that of the
15 unique ID.
7. The recording/reproducing apparatus according to claim 1, wherein, in a case where the directory or the file referred to by the object reference information is detected not to be present in the directory hierarchy,
20 the contents management information processing part searches the file system information for the same value as that of the unique ID recorded in the object management information, and when a directory or a file assigned the same value as that of the unique ID is not detected, the contents management information processing part deletes the object management
25 information from the contents management information.
8. The recording/reproducing apparatus according to claim 1, wherein, in a case where information in a volume managed by the file system information is updated by the recording/reproducing part on the recording medium,
30 the file system information processing part updates volume update information contained in volume structure information managed by the file system information, and
the contents management information processing part records the same information as the volume update information in the contents
35 management information.
9. The recording/reproducing apparatus according to claim 8, wherein the

volume update information includes at least one selected from the group consisting of:

(1) information representing a last update date and time of the volume;

5 (2) information representing a maximum value of a unique ID that is identification information not duplicated on the recording medium, contained in the file system information;

(3) a total number of files contained in the file system information; and

10 (4) a total number of directories contained in the file system information.

10. The recording/reproducing apparatus according to claim 8, wherein, in a case where the volume update information contained in the volume structure
15 information managed by the file system information is not matched with the information in the contents management information,

the contents management information processing part searches the file system information for the same value as that of the unique ID recorded in the object management information, and when a directory or a file
20 assigned the same value as that of the unique ID is detected, the contents management information processing part sets new object reference information in the object management information with respect to a path name of the directory or the file assigned the same value as that of the unique ID.

25 11. The recording/reproducing apparatus according to claim 8, wherein, in a case where the volume update information contained in the volume structure information managed by the file system information is not matched with the information in the contents management information,

30 the contents management information processing part searches the file system information for the same value as that of the unique ID recorded in the object management information, and when a directory or a file assigned the same value as that of the unique ID is not detected, the contents management information processing part deletes the object management
35 information from the contents management information.

12. The recording/reproducing apparatus according to claim 8, wherein, in a

case where the volume update information contained in the volume structure information managed by the file system information is not matched with the information in the contents management information, the recording/reproducing part stops recording of a new directory or a new file on the recording medium.

13. A recording/reproducing method for recording or reproducing information with respect to a recording medium by a recording/reproducing apparatus,

the information recorded or reproduced with respect to the recording medium being managed as a file, using file system information having a directory hierarchical structure capable of being referred to by a path name, the directory and the file being managed, using contents management information containing object management information referred to by object reference information on the path name,

the recording/reproducing method comprising: when information on the recording medium is updated by the recording/reproducing apparatus, recording information on the update in the file system information; and

recording the information on the update in the object management information.

14. The recording/reproducing method according to claim 13, further comprising, in a case where a new directory or a new file is recorded on the recording medium, assigning a unique ID that is identification information not duplicated on the recording medium to the directory or the file,

wherein the assigned unique ID is used as the information on the update in two processes of recording the information on the update.

15. The recording/reproducing method according to claim 14, wherein, in assigning the unique ID, a value of the unique ID is determined so as not to be duplicated in the file system information.

16. The recording/reproducing method according to claim 14, wherein, in assigning the unique ID, a value of the unique ID is determined so as not to be duplicated in the contents management information.

17. The recording/reproducing method according to claim 13, further comprising detecting whether or not the directory or the file referred to by the object reference information is present in the directory hierarchy,

5 the method further comprising: in a case where the directory or the file referred to by the object reference information is detected not to be present in the directory hierarchy, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

10 when a directory or a file assigned the same value as that of the unique ID is detected, setting new object reference information in the object management information with respect to a path name of the directory or the file assigned the same value as that of the unique ID.

18. The recording/reproducing method according to claim 13, further comprising detecting whether or not the directory or the file referred to by the object reference information is present in the directory hierarchy,

20 the method further comprising: in a case where the directory or the file referred to by the object reference information is detected not to be present in the directory hierarchy, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

25 when a directory or a file assigned the same value as that of the unique ID is not detected, deleting the object management information from the contents management information.

19. The recording/reproducing method according to claim 13, further comprising: in a case where information in a volume managed by the file system information is updated by the recording/reproducing apparatus on the recording medium,

30 updating volume update information contained in volume structure information managed by the file system information; and

recording the same information as the volume update information in the contents management information.

35 20. The recording/reproducing method according to claim 19, wherein the volume update information includes at least one selected from the group consisting of:

(1) information representing a last update date and time of the volume;

(2) information representing a maximum value of a unique ID that is identification information not duplicated on the recording medium, contained
5 in the file system information;

(3) a total number of files contained in the file system information;
and

(4) a total number of directories contained in the file system information.

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21. The recording/reproducing method according to claim 19, further comprising confirming whether or not the volume update information contained in the volume structure information managed by the file system information is matched with the information in the contents management
15 information,

the method further comprising: in a case where the information is not matched, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

when a directory or a file assigned the same value as that of the
20 unique ID is detected, setting new object reference information in the object management information with respect to a path name of the directory or the file assigned the same value as that of the unique ID.

22. The recording/reproducing method according to claim 19, further
25 comprising confirming whether or not the volume update information contained in the volume structure information managed by the file system information is matched with the information in the contents management information,

the method further comprising: in a case where the information is not
30 matched, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

when a directory or a file assigned the same value as that of the
unique ID is not detected, deleting the object management information from the contents management information.

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23. The recording/reproducing method according to claim 19, further comprising confirming whether or not the volume update information

contained in the volume structure information managed by the file system information is matched with the information in the contents management information,

5 the method further comprising: in a case where the information is not matched, stopping recording of a new directory or a new file on the recording medium.

24. A computer program providing medium storing a computer program that is read by a computer and allows the computer to function as a
10 recording/reproducing apparatus for recording or reproducing information with respect to a recording medium,

the information recorded or reproduced with respect to the recording medium being managed as a file, using file system information having a directory hierarchical structure capable of being referred to by a path name,
15 the directory and the file being managed, using contents management information containing object management information referred to by object reference information on the path name,

the computer program comprising an instruction for allowing the computer to perform the processes of: when information on the recording
20 medium is updated by the computer,

generating information on the update;

recording the information on the update in the file system information; and

25 recording the information on the update in the object management information.

25. The computer program providing medium according to claim 24, wherein the computer program further comprises an instruction for allowing the computer to perform the process of, in a case where a new directory or a
30 new file is recorded on the recording medium, assigning a unique ID that is identification information not duplicated on the recording medium to the directory or the file as the information on the update.

26. The computer program providing medium according to claim 24, wherein the computer program further comprises an instruction for allowing the computer to perform the processes of: in a case where information in a volume managed by the file system information is updated by the computer
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on the recording medium,

updating volume update information contained in volume structure information managed by the file system information; and

5 recording the same information as the volume update information in the contents management information.

27. The computer program providing medium according to claim 24, the computer program further comprising an instruction for allowing the computer to perform the process of detecting whether or not the directory or
10 the file referred to by the object reference information is present in the directory hierarchy,

in a case where the directory or the file referred to by the object reference information is detected not to be present in the directory hierarchy, searching the file system information for the same value as that of the unique
15 ID recorded in the object management information; and

when a directory or a file assigned the same value as that of the unique ID is detected, setting new object reference information in the object management information with respect to a path name of the directory or the file assigned the same value as that of the unique ID.
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28. The computer program providing medium according to claim 24, the computer program further comprising an instruction for allowing the computer to perform the process of detecting whether or not the directory or the file referred to by the object reference information is present in the
25 directory hierarchy,

in a case where the directory or the file referred to by the object reference information is detected not to be present in the directory hierarchy, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

30 when a directory or a file assigned the same value as that of the unique ID is not detected, deleting the object management information from the contents management information.

29. The computer program providing medium according to claim 26, the computer program further comprising an instruction for allowing the computer to perform the process of confirming whether or not the volume update information contained in the volume structure information managed
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by the file system information is matched with the information in the contents management information,

in a case where the information is not matched, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

when a directory or a file assigned the same value as that of the unique ID is detected, setting new object reference information in the object management information with respect to a path name of the directory or the file assigned the same value as that of the unique ID

30. The computer program providing medium according to claim 26, the computer program further comprising an instruction for allowing the computer to perform the process of confirming whether or not the volume update information contained in the volume structure information managed by the file system information is matched with the information in the contents management information,

in a case where the information is not matched, searching the file system information for the same value as that of the unique ID recorded in the object management information; and

when a directory or a file assigned the same value as that of the unique ID is detected, deleting the object management information from the contents management information.

31. The computer program providing medium according to claim 26, the computer program further comprising an instruction for allowing the computer to perform the process of confirming whether or not the volume update information contained in the volume structure information managed by the file system information is matched with the information in the contents management information,

in a case where the information is not matched, stopping recording of a new directory or a new file on the recording medium.

32. A recording medium storing file system information having a directory hierarchical structure capable of being referred to by a path name, for managing information to be recorded or reproduced as a file, and

object management information referred to by object reference information on the path name, for managing the directory and the file,

wherein the file system information and the object management information contain information on an update of the information to be recorded or reproduced.

- 5 33. The recording medium according to claim 32, wherein the information on the update of the information to be recorded or reproduced is a unique ID as identification information assigned to an updated directory or file so as not to be duplicated with that of other directories or files on the recording medium.

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34. The recording medium according to claim 32, wherein the information on the update of the information to be recorded or reproduced includes at least one selected from the group consisting of:

- 15 (1) information representing a last update date and time of the volume managed by the file system information on the recording medium;
 (2) information representing a maximum value of a unique ID that is identification information not duplicated on the recording medium, contained in the file system information;
 (3) a total number of files contained in the file system information;
20 and
 (4) a total number of directories contained in the file system information.